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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,423	03/16/2001	Jens Klein		4925

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EXAMINER	
SODERQUIST, ARLEN	

ART UNIT	PAPER NUMBER
1743	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	09/809,423	KLEIN ET AL.
	Examiner	Art Unit
	Arlen Soderquist	1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *39,41,44,45,48,50-53,55-59,61,62,65-67 and 69-76* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *39,41,44,45,48,50-53,55-59,61,62,65-67 and 69-76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

1. Applicant's amendment dated April 6, 2007 was submitted prior to the mailing of the last Office action, therefore, a new Office action is being sent to address the changes in the claims added in the above amendment.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 39, 41, 44-45, 48, 50-53, 55-59, 61-62, 65-67 and 69-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner (US 6,508,984) in view of Moates, McFarland (US 6,541,271) or Willson (either WO 97/32208, Willson '208 or US 6,063,633, Willson '633) and Weinberg (US 5,959,297). In the patent Turner teaches a system for creating and testing novel catalyst. A method and system for researching and developing and/or optimizing new catalysts and products in a combinatorial manner is disclosed. The method begins with starting components or a ligand library and provides methods of creating catalyst or product libraries, which are then tested in a reaction of interest. The system uses methods of robotic handling for moving libraries from station to station. The method and apparatus are especially useful for synthesizing, screening, and characterizing combinatorial catalyst libraries, but also offer significant advantages over conventional experimental methods as well. The summary of the invention in column 2, lines 33-64 teach that one or more catalyst libraries are created and the catalyst library is subjected to a reaction of interest. The reaction of interest may be a reaction that creates a product library. Alternatively, the reaction of interest may be a screen for activity. The reaction of interest can have process conditions that are combinatorialized, such as varying

amounts of reactants or different conditions (such as time, temperature, pressure, atmosphere, etc.). Or particularly relevant to the instant claims, the method optionally provides different screening stages, such as a primary screen to eliminate some members from a library from going on to a secondary screen. Column 3, lines 27-35 teach that the embodiments of are combined into a flexible system that includes a number of different stations including one or more stations for combining starting materials, daughtering the libraries, performing the reactions of interest and screening the results of the process. The system includes a control system that controls, monitors and directs the activities of the system so that a user may design an entire series of experiments by inputting library design, screening or data manipulation criteria. Examples of different types of catalyst libraries are given in columns 7-8. Different infrared screening reactors are described in column 12, line 52 to column 13, line 10. This includes infrared Column 14, lines 24-30 teach other instruments such as GC- Mass Spectrometry that can be used in screening. Column 14, lines 40-55 discusses the daughtering of catalyst libraries and teaches that a part of the catalysts may be daughtered into the daughter libraries. More typically, however, **each member of the ligand library is daughtered to one or more daughter libraries 200, as is shown in figure 2**. Figure 2 shows the system with its possibilities. Relevant to the instant claims is the description of path Y beginning at column 15, line 54. Path Y shows a research path having multiple reactions and screens. The catalyst library (220) is daughtered into daughter catalyst libraries (222) with the daughter libraries each being screened in a primary screen (110). A primary screen is one that runs the reaction of interest, and provides sufficient data to determine at least whether a catalyst member was active in the reaction of interest or whether a product of interest was formed in the reaction. A primary screen may be one where the catalysts or products are not separated from each other, but subjected together to the reaction of interest in a parallel optical screen. For example, if the reaction of interest is the polymerization of ethylene, the primary screen may be a chamber that allows ethylene to contact all catalyst library members simultaneously. The active catalysts may be identified from the inactive or less active catalysts. The primary screen may be an **infrared screen that identifies active catalysts by heat of reaction**, such as disclosed in copending U.S. Patent application Serial No. 08/946,135, filed October 7, 1997. The primary screen may be another optical technique to determine if a product has been made; for example, if the reaction of interest is an

emulsion polymerization, the optical screen may determine if an emulsion was created. Other primary screens may be known or developed by those of skill in the art for specific reactions of interest. Any screen may be a primary screen, however, the object of having a primary screen is to eliminate some of the members (221,223) of the catalyst libraries or daughter catalyst libraries from further, more detailed testing. This says that the more detailed testing of the secondary screen is not performed on all members of a library. However, it does not say that new libraries are created for the secondary screens. Since an enormous number of ligands and metal precursors are typically being combined in different routes, it may be that one route is not applicable for a particular metal precursor/ligand combination. A primary screen would eliminate such an inapplicable route at a lower cost than a screen that provides more detailed information. As such primary screens are designed to quickly, effectively and/or efficiently reduce the number of catalyst members that are screened for detailed information (such as conversion and **selectivity** or polymer particle size). This also does not say that new libraries are created for the secondary screen. Path Y also shows that after the primary screen, members of catalyst libraries (220,222) that pass the primary screen are sent to a secondary screen (112). (Figure 2 shows the entire catalyst libraries used in the primary screen being sent to the secondary screen.) In this embodiment or path, daughtering occurs prior to the primary screen, but there is no teaching that daughtering occurs between the primary screen and secondary screen. The secondary screen runs the same reaction of interest under conditions that supply more data than the primary screen. Figures 5 and 7 illustrate methodology and apparatus configurations that can be used. In reference to figure 5, column 17, lines 54-61 teach that at a screening station, a predetermined screen is run to determine if the reaction of interest was successful and/or the qualitative or quantitative degree of success of the reaction of interest. **The screening station may include** a single screen or **multiple screens (such as a primary and secondary screen)** and may entail using multiple locations for the multiple screens. Again this section does not teach making new libraries between the screens when there are multiple screens. While teaching primary and secondary screen options that include the instantly claimed screens (see bold sections above) Turner does not teach the specific combination claimed or the system used on inorganic catalyst libraries.

In the paper Moates teaches infrared thermographic screening of combinatorial libraries of heterogeneous catalysts. A combinatorial library of catalyst candidates, each consisting of a different metal element supported on -alumina, is screened for hydrogen oxidation catalytic activity. Heat liberated on the surface of active catalysts by the catalyzed reaction is detected by noninvasive IR thermography. A 16-candidate library identifies four distinctly active pellets, which correspond to active formulations known from the literature. A higher density library shows similar results, but heat and mass transport effects influence the pellet temperatures. This method may be used to screen and optimize catalyst formulations more efficiently and quickly than current methods and may also be useful for study of operational lifetime, resistance to poisons, and regenerability.

The McFarland patent resulted from the application referenced by Turner as an infrared screen that identifies active catalysts by heat of reaction. In particular figure 4 shows a reaction chamber that monitors thermal emission due to a reaction occurring therein. Columns 6-7 teach various types of catalyst including inorganic types. The discussions of figure 3-5 teach that this is a good technique to monitor or screen large numbers of catalysts.

Both Willson '208 and Willson '633 come from the same application and therefore contain the same disclosure. While this explanation of the Willson references will refer to the Willson '633 patent, corresponding disclosure is found in the Willson '208 application. Willson '633 teaches a catalyst testing process and apparatus. In column 1 lines 27-40, Willson '633 teaches that catalyst testing was conventionally accomplished in bench scale or larger pilot plants in which the feed is contacted with a catalyst under reaction conditions, generally with effluent products being sampled, often with samples being analyzed and results subjected to data resolution techniques. Those procedures can take a day or more for a single run on a single catalyst. While those techniques have value in fine-tuning the optimum matrices, pellet shape, etc., the Willson '633 invention permits the scanning of dozens of catalysts in a single set-up, ***often in less time than required for a single catalyst to be evaluated by conventional methods***. Further, when practiced in its preferred robotic embodiments, the invention can sharply reduce the labor costs per catalyst screened. In the apparatus and method a multicell holder e.g. a honeycomb (microchannel array) or plate, or a collection of individual support particles, is treated with solutions/suspensions of catalyst ingredients to produce cells, spots or pellets

holding each of a variety of combinations of the ingredients, is dried, calcined or treated as necessary to stabilize the ingredients in the cells, spots or pellets, then is contacted with a potentially reactive feed stream or batch e.g., biochemical, gas oil, hydrogen plus oxygen, propylene plus oxygen, $CC1_2F_2$ and hydrogen, etc. figures 1-6 show the variety of multicell holders that can be used. The reaction occurring in each cell can be measured, e.g. by infrared thermography, spectroscopic detection of products or residual reactants, or by sampling, e.g. by multistreaming through low volume tubing, from the vicinity of each combination, followed by analysis e.g. spectral analysis, chromatography etc, or by observing temperature change in the vicinity of the catalyst e.g. by thermographic techniques, to determine the relative efficacy of the catalysts in each combination. Robotic techniques can be employed in producing the cells, spots, pellets, etc. Columns 2-3 summarize some of the aspects of the invention including reaction types, sensors, catalyst taggants and reactions conditions. The reaction types include any reaction enhanced by the presence of a catalyst such as polymerization reactions, halogenation, oxidation, hydrolysis, esterification, reduction and any other conventional reaction which can benefit from a catalyst. Hydrocarbon conversion reactions, as used in petroleum refining are an important use of the invention and include reforming, fluid catalytic cracking, hydrogenation, hydrocracking, hydrotreating, hydrodesuilirizing, alkylation and gasoline sweetening. The sensors used to detect catalytic activity in the candidate catalysts include chromatographs, temperature sensors, and spectrometers. Especially those adapted to measure temperature and/or products near each specific catalyst spot e.g. by multistreaming, multitasking, sampling, fiber optics, or laser techniques such as thermography, as by an infrared camera recording the temperature at a number of catalyst sites simultaneously, NMR, NIR, TNIR, electrochemical, fluorescence detectors, Raman, flame ionization, thermal conductivity, mass, viscosity and stimulated electron or X-ray emission. Figures 7 and 9 show that the reactions occurring with the catalyst candidates on the substrate can be measured with a plurality of different measuring devices that are capable of measuring temperature or determining selectivity. Optionally taggants (labels) can be added to identify particular catalysts, particularly where particles are employed as supports for the catalysts. These taggants can be conventional as discussed in the literature. Taggants can be chemicals that are stable at reaction conditions or can be radioactive with distinctive emissions. The techniques of combinatorial chemistry will be applicable with

taggants as well as with catalysts chosen to suit the particular reaction to be enhanced by the catalyst (some of the samples are selected based on the results). Temperatures, pressures, space velocities and other reaction conditions can be varied and will be determined by the reactants and reaction. The intent of the process is to screen for catalysts having improved properties for a desired reaction. Example 3 shows the selection being based on the presence of carbon dioxide in the product stream by using an appropriate wavelength of infrared radiation. Example 5 teaches the particles showing activity being collected and analyzed for the content of labeling materials to determine the composition of the material giving the desired catalytic activity.

In the patent Weinberg teaches mass spectrometers and methods for rapid screening of libraries of different materials. Methods and apparatus for screening diverse arrays of materials are provided. Techniques are provided for rapidly characterizing compounds in combinatorial arrays of materials for discovering and/or optimizing new materials with specific desired properties. A scanning mass spectrometer is used which includes an ionization chamber and a collector that outputs an electrical signal responsive to the quantity of gas ions contacting the collector surface. A conduit system selectively withdraws samples from the array of materials, passing the samples into the ionization chamber. In a specific embodiment, reactants are passed through the conduit system to the selected regions of interest on the substrate. Figures 13-14 illustrate a methods of employing a differentially pumped mass spectrometer for sampling a product stream or volume surrounding a library compound. Column 5, lines 35-37 teach that the system can identify activity or selectivity (a desired product).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an infrared screen method as taught by Moates, McFarland, Willson ‘633 or Willson ‘203 as the primary screen of Turner and the screen of Weinberg as the secondary screen of Turner because of the citation of McFarland by Turner as a primary screening method or the ability to select catalyst formulations having a desired activity from a large number of catalysts as taught by Moates, McFarland, Willson ‘633 or Willson ‘203 and as required for the primary screen of Turner. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the screen of Weinberg or a monitor capable of monitoring selectivity from those taught by Willson ‘633, Willson ‘203 as the secondary screen of Turner because of the ability to monitor a desired product (selectivity) as required for the secondary screen of

Turner and the ability to measure both on a single substrate as shown by Willson '633 or Willson '203. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the device and method of Turner to screen inorganic catalysts because as shown by Willson '633 and Willson '203 the techniques are not limited to one type of catalyst.

4. Applicant's arguments filed April 6, 2007 have been fully considered but they are not persuasive. Relative to the claims examiner notes that the instant claims are written in open language allowing for the presence of additional steps beyond those that are in the claim. Thus, following the simultaneous measuring step the starting material could be stopped, the building blocks moved to a second apparatus or a daughter plate made with the subset of the original set and the starting material could be introduced again to produce the effluent stream that is measured with the further sensor. Relative to the argument that none of the references teach carrying out measurements on the same sample with the same apparatus using the same substrate examiner notes that Turner teaches a single apparatus. Additionally it is clear that Turner eliminates some of the catalyst members from further testing. However, there is no teaching that in path Y new catalyst libraries are formed between the primary and secondary screens including in the section pointed to by applicant – column 16, lines 39-44. Additionally it is clear that for what is shown in figure 2, a daughter library has the same catalyst members as are found in the parent library (see column 14, lines 40-55). Additionally figure 2 of Turner uses the same reference numbers (220,222) for the catalyst libraries sent to the two screen. This would indicate that Turner does not create new libraries to send to the secondary screen. Finally Turner clearly indicates that a single screening station can have both the primary and secondary screens. Again indicating that the secondary screen is performed on the same library as used for the primary screen. The difference being that the secondary screen is not performed on the catalyst members eliminated from further testing by the primary screen. Thus the Turner process and apparatus are within the scope of the instantly claimed apparatus and method. Furthermore, the Willson '633 reference clearly shows that both the temperature measuring and selectivity measuring devices can perform their measurements on the same substrate containing catalyst candidates. If applicant wished to exclude the possibility of additional steps and or apparatus as found in Turner, the claims need to include structure combinations that would appropriately limit the scope of the instant claims (possibly a reactor containing the substrate with the catalyst library

operatively connected to a first and second sensor). This appears to be what applicant is trying to argue, that the first and second screens are carried out in the same reactor in a sequential manner so that there is no need to transfer the substrates or stopping the reactant flow. That is certainly commensurate with what is shown in the instant figures, but not the claims. If that is what applicant is trying to argue, then the claims should be of a scope that is commensurate with the arguments.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (571) 272-1265. The examiner can normally be reached on Monday-Thursday and Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arlen Soderquist
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Art Unit 1743

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